

Notice of Allowability

Application No.

10/532,768

Applicant(s)

SASAKI ET AL.

Examiner

Art Unit

Asok K. Sarkar

2891

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 4/27/2005.
2. ☒ The allowed claim(s) is/are 18-28.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some* c) ☐ None of the:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DÉPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|---|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____ |
| 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date <u>4/27/05</u> | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____ |

DETAILED ACTION

EXAMINER'S AMENDMENT

1. In view of allowable subject matters, the Applicant's representative was contacted to amend few claims.
2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Jeffrey Filipek on November 27, 2006.

The application has been amended as follows:

In claim 24, line 4, following the word "gas", - - and a concentration of the first substance in the mixed substance is below 0.05% - - was inserted.

In claim 28, line 4, following the word "gas", - - and a concentration of the first substance in the mixed substance is below 0.05% - - was inserted.

Allowable Subject Matter

3. Claims 18 – 28 are allowed.
4. The following is an examiner's statement of reasons for allowance:

Claims 18 – 25, 27 and 28 recite, inter alia, a plasma doping method comprising the steps of generating mixed plasma of a mixed substance made of a first substance containing impurity to be doped and a second substance having higher ionization energy than the first substance, the mixed plasma having ion current density of 1.1

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mA/cm² or higher and doping an impurity on a substrate using the mixed plasma, wherein an amount of the second substance is larger than that of the first substance; the first substance is B₂H₆; the second substance is rare gas; a concentration of B₂H₆ in the mixed substance is below 0.05% and a dose of impurity on the substrate is controllable by changing application time of bias voltage in the step of doping.

Although, Ohira, US 6,403,410; Mizuno, US 6,784,080 and Horsky, US 2006/0238133 teach methods for plasma doping they fail to teach the above limitations. Moreover, the art of record does not disclose or anticipate the above limitation in combination with other claim elements nor would it be obvious to modify the art of record so as to form a device including the above limitation.

Claim 26 recites, inter alia, a plasma doping method comprising the steps of generating mixed plasma of a mixed substance including a first substance containing impurity to be doped and a second substance having higher ionization energy than the first substance, the mixed plasma having electron temperature of 6.0 eV or higher and doping impurity on a substrate using the mixed plasma, wherein an amount of the second substance is larger than that of the first substance, the first substance is selected from at least one of B₂H₆, BF₃ and B₁₀H₁₄, the second substance is selected from at least one of He, Ne, Rn, AR, H, N, O, Kr, Xe, Cl, H₂, NO, N₂, O₂, CO, CO₂, H₂O, SF₆, Br₂ and Cl₂, a concentration of the first substance in the mixed substance is below 0.05% and a dose of impurity on the substrate is controllable by changing application time of bias voltage in the step of doping.. Although, Ohira, US 6,403,410; Mizuno, US 6,784,080 and Horsky, US 2006/0238133 teach methods for plasma doping they fail to

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teach the above limitations. Moreover, the art of record does not disclose or anticipate the above limitation in combination with other claim elements nor would it be obvious to modify the art of record so as to form a device including the above limitation.

Conclusion

5. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asok K. Sarkar whose telephone number is 571 272 1970. The examiner can normally be reached on Monday - Friday (8 AM- 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William B. Baumeister can be reached on 571 272 1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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7. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Asok K. Sarkar
November 27, 2006

Primary Examiner